

## **1.1 RISK ANALYSIS & DISASTER MANAGEMENT PLAN**

Hazard Identification is a critical step in Risk Analysis. A classical definition of hazard states that hazard is in fact the characteristic of system/plant/process that presents potential for an accident. Hence all the components of a system/plant/process need to be thoroughly examined to assess, their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

In Risk Analysis terminology, a hazard is something with the potential to cause harm. Hence the Hazard Identification step is an exercise that seeks to identify what can go wrong at the major hazard installation or process in such a way that people may be harmed. The output of this step is a list of events that need to be passed on to later steps for further analysis.

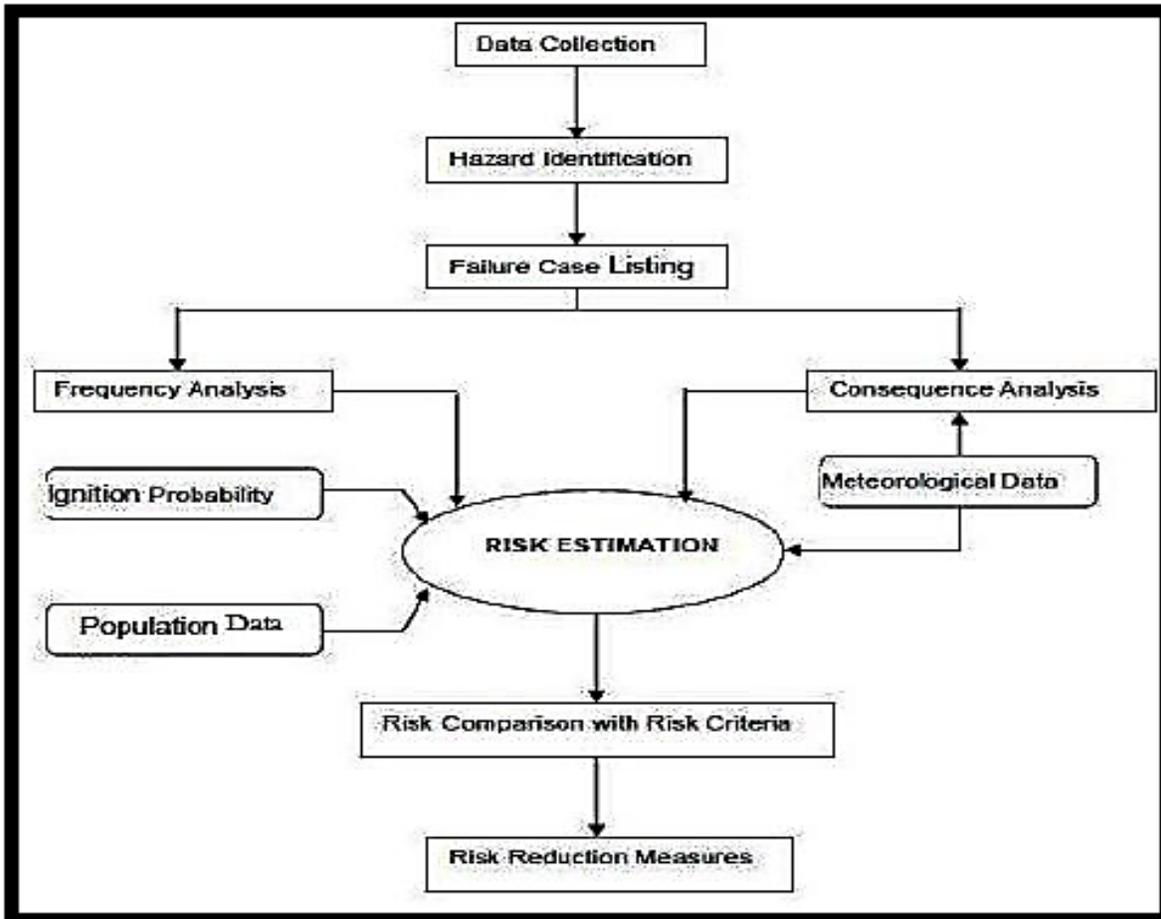
Risk analysis deals with identification and computation of consequence and risks. Risk analysis follows an extensive hazard analysis. This requires a thorough knowledge of probability of failure, possible accident scenario, vulnerability of population to exposure etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident scenarios. It provides basis for preparation of on-site and off-site emergency plan and to incorporate safety measures.

Secured Land Filling (SLF) and allied activities as a part of the Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs) are associated with several potential hazards to both the employees and the public. A worker in a TSDF site should be able to work under conditions, which are adequately safe and healthy. At the same time, the environmental conditions should be such as not to impair his working efficiency. This is possible only when there is adequate safety in TSDF site.

The objective of the Risk Analysis study is to identify vulnerable zones, major risk contributing events, understand the nature of risk posed to nearby areas and form a basis for the Emergency Response Disaster Management Plan (ERDMP). In addition, the Risk Analysis is also necessary to ensure compliance to statutory rules and regulations. Risk assessment methodology is given in Figure 27 below-

Steps of the risk analysis is as follows-

- Identification of Hazards and Selection of Scenarios
- Effects and Consequence Calculations
- Risk Summation (Risk calculation)
- Risk assessment (using an acceptability criteria)
- Risk Mitigation Measures



**FIGURE 1: RISK ANALYSIS METHODOLOGY**

## 1.2 HAZARD IDENTIFICATION

Identification of hazards in the proposed project expansion of TSDf phase IV which is Secured Land Filling (SLF) as a part of the Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs) is of primary significance of the analysis, and quantification of risk hazard indicates the characteristics of hazardous wastes that pose potential for an emergency situation in the event of spillage and accidental release of hazardous wastes from the site.

All the components of a system/plant/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

Explosive wastes in form of explosive solid and explosive liquid.

1. Flammable wastes
2. Corrosive Wastes
3. Reactive wastes

#### 4. Toxic wastes

Flammable wastes containing solvent residue, can form explosive mixture with air, and heating may cause pressure rise with risk of bursting and explosion. Some time vapour may be heavier than air and spreads along with the ground, narcotic in high concentrations, gives off toxic or irritant fumes in a fire.

Various type of organic hazardous wastes, paint wastes, waste oil, etc. are flammable in nature and can catch fire if getting source of ignition. There will be release of toxic fume at the time of burning in the event of fire.

##### **1.2.1 Other Hazard and Control**

###### **Human Health Risk from TSDF Site**

Toxic wastes and inflammable waste managed and disposed at the proposed TSDF can release constituents of concern (CoCs) as vapors or particles to the air. wind-blown erosion of disposed hazardous waste or as leachate to the ground water. Hazardous wastes managed in barrels or tanks can release COCs into the atmosphere via volatilization. During the operation of TSDF site, wastes may be entered into the environment through the following sources:

- Emission of particulate matters due to windblown erosion of disposed wastes;
- Volatilization of organic liquid wastes;
- Infiltration of leachate into ground and subsequently contamination of ground water in an unlikely event of damage to liner system of TSDF site;
- Spillage of contaminated run off from the TSDF site during heavy rains;

###### **Risk Mitigation Measures for Proposed Expansion of TSDF**

Risk mitigation measures have been described for the proposed TSDF site as given below:

##### **1.2.2 Collection and Transportation of Hazardous Wastes**

Following requirements pertaining to the transportation of hazardous wastes shall be ensured:

- Vehicle used for transportation shall be in accordance with the provisions under the Motor Vehicles Act, 1988, and rules made there under.
- Transporter shall possess requisite copies of the certificate (valid authorization obtained from the GPCB for transportation of wastes by the waste generator and operator of a facility) for transportation of hazardous waste.
- Transporter shall have valid "Pollution under Control Certificate" (PUCC) during the transportation of HW and shall be properly displayed.
- Vehicles shall be painted preferably in blue colour with white strip of 15 to 30 cm width running centrally all over the body to facilitate easy identification.

- Vehicle shall be fitted with mechanical handling equipment for safe handling and transportation of wastes. The words "HAZARDOUS WASTE" shall be displayed on all sides of the vehicle in Gujarati language, Hindi, and English.
- Name of the transporter shall be displayed.
- Emergency phone numbers and TREM Card as per HWM Rule as amended shall be displayed properly.
- Vehicle shall be fitted with roll-on/roll-off covers if the individual containers do not possess the same.
- Carrying of passengers shall be strictly prohibited except for the waste haulers. Access to these waste haulers shall be restricted to the cabins only.
- Transporter will carry documents of manifest for the wastes during transportation as required under HWM Rules.
- The trucks shall be dedicated for transportation of hazardous wastes and they shall not be used for any other purpose.
- Each vehicle shall carry first-aid kit, spill control equipment and fire extinguisher.
- HW transport vehicle shall run only at a speed specified under Motor Vehicles Act to avoid any eventuality during the transportation of HW.
- The driver of the transport vehicle shall at least have cleared the SSC exam (10th standard) and shall have valid driving license for heavy vehicles from the State Road Transport Authority and shall have experience in transporting the chemicals.
- Driver(s) shall be properly trained for handling the emergency situations and safety aspects involved in the transportation of hazardous wastes.
- The design of the trucks shall be such that there is no spillage during transportation

### **1.2.3 Storage area (Storage Shed)**

- Flammable, ignitable, reactive and non-compatible wastes should be stored separately and never should be stored in the same storage shed.
- Storage area may consist of different sheds for storing different kinds of hazardous wastes and sheds should be provided with suitable openings.
- Storage area should be designed to withstand the load of waste stocked and any damage from the hazardous waste spillage.
- Loading and unloading of wastes in storage sheds should only be done under the supervision of the well trained and experienced staff.
- The storage and handling should have at least two openings/ routes to escape in the event of any fire in the area.
- Doors and approaches of the storage area should be of suitable sizes for entry of fork lift and fire fighting equipment;
- The exhaust of the vehicles used for the purpose of handling, lifting and transportation within the facility such as forklifts or trucks should be fitted with the approved type of spark arrester.
- In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area should be provided with concrete floor or steel sheet depending

on the characteristics of waste handled and the floor must be structurally sound and chemically compatible with wastes.

- All the storage yards should be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to fire fighting.

#### **1.2.4 Storage Drums/Containers**

- The container shall be made or lined with the suitable material, which will not react with, or in other words compatible with the hazardous wastes proposed to be stored.
- The stacking of drums in the storage area should be restricted to three high on pallets (wooden frames). Necessary precautionary measures should be taken so as to avoid stack collapse. However, for waste having flash point less than 65.5<sup>o</sup> C, the drums should not be stacked more than one height.
- No drums should be opened in the storage sheds for sampling etc. and such activity should be done in designated places out side the storage areas;
- Drums containing wastes stored in the storage area should be labeled properly indicating mainly type, quantity, characteristics, source and date of storing etc.

#### **1.2.5 Spillage/Leakage Control Measures**

- The storage areas should be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers should be removed and ensured that such contents are transferred to a sound container.
- In case of spills/leaks/dry adsorbents/cotton should be used for cleaning instead of water.
- Proper slope with collection pits be provided in the storage area so as to collect the spills/leakages.
- Storage areas should be provided with adequate number of spill kits at suitable locations. The spill kits should be provided with compatible sorbent material in adequate quantity.

#### **1.2.6 Fire Protection System**

- The fire protection system shall comprise of:
  - Fire detection and alarm system for waste storage area
  - Fire Fighting system shall comprises of following major equipment and systems;
  - Electric driven main fire pumps with emergency power from standby Diesel Genset for hydrant network serving of hydrants and hose reels;
  - All necessary pump controls complete with all accessories for the above-mentioned pumps;
  - All necessary sign-posting for the water-hydrant ring system including brackets, complete with accessories;
  - All electrical rooms will be provided with clean agent automatic fire extinguisher systems

- Complete addressable analogue fire detection system with heat and smoke detectors for various plant area including storages with necessary cabling, interface panels, controllers, sounders, manual call points, sirens, response indicators, and all necessary hardware and accessories; and
- All necessary electrical equipment, such as LV switch-gear, LV motors, LV power and control cables, control panels with alarm, PBB and interlocks, necessary DC systems, push button stations, cable trays and accessories, cabling, glands lugs, earthing and lightning protection conforming to relevant electrical specifications.

### **1.2.7 Miscellaneous risk Mitigation Measures**

- Smoking shall be prohibited in and around the storage areas;
- Good housekeeping needs to be maintained around the storage areas.
- Signboards showing precautionary measures to be taken, in case of normal and emergency situations should be displayed at appropriate locations.
- To the extent possible, manual operations within storage area are to be avoided. In case of manual operation, proper precautions need to be taken, particularly during loading/unloading of liquid hazardous waste in drums.
- A system for inspection of storage area to check the conditions of the containers, spillages, leakages etc. should be established and proper records should be maintained.
- The wastes containing volatile solvents or other low vapor pressure chemicals should be adequately protected from direct exposure to sunlight and adequate ventilation should be provided.
- Storage sites should have adequate & prompt emergency response equipment systems for the hazardous waste stored on-site. This should include firefighting arrangement based on the risk assessment, spill management, evacuation and first aid.
- Immediately on receipt of the hazardous waste, it should be analyzed and depending upon its characteristics and storage & disposal should be finalized.
- Only persons authorized to enter and trained in hazardous waste handling procedures should have access to the hazardous waste storage areas.
- Mock drill for onsite emergency shall be conducted regularly and records maintained.

### **1.2.8 Display of Necessary Information at TSDF Site**

Necessary information containing the following elements shall be displayed at the site.

- Waste type (ignitable, toxic, reactive, etc)
- Approximately quantity of each type of wastes
- Generation location of waste storage area
- Evacuation point

### **1.2.9 General Recommendations**

- All precautions will be taken to attend any emergency due to handling, storage and disposal of such hazardous wastes.
- Safety measures such as fire fighting system facility already working at TSDF site will be provided during the emergency.
- Proper handling of hazardous chemical, hazardous wastes, regular cleaning & proper placement of material will be maintained during operational phase.